



SEQUENCE LISTING

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<120> Apparatus and Method for Automated Protein Design

<130> A-65353-6/RFT/RMS/RMK

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<150> 09/058,459

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<170> PatentIn Ver. 2.1

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Lys Pro Phe Gln Cys Arg Ile Cys Met Arg Asn Phe Ser Arg Ser Asp  
1 5 10 15

His Leu Thr Thr His Ile Arg Thr His Thr Gly Glu  
20 25

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<211> 28

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<220>

<223> Description of Artificial Sequence: Synthetic

<400> 2

Lys Pro Tyr Thr Ala Arg Ile Lys Gly Arg Thr Phe Ser Asn Glu Lys  
1 5 10 15

Glu Leu Arg Asp Phe Leu Glu Thr Phe Thr Gly Arg  
20 25

<210> 3  
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<220>  
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<400> 3  
Gln Gln Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Glu Lys  
1 5 10 15

Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
20 25

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<400> 4  
Glu Gln Tyr Thr Ala Lys Ile Lys Gly His Thr Phe Arg Asn Glu Lys  
1 5 10 15

Glu Leu Arg Asp Phe Ile Glu Arg Phe Lys Gly Arg  
20 25

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<220>  
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<400> 5  
Gln Gln Tyr Thr Ala Lys Ile Arg Gly Thr Thr Phe Arg Asn Glu Lys  
1 5 10 15

Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
20 25

<210> 6  
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<400> 6  
 Gln Gln Tyr Thr Ala Lys Phe Lys Gly Arg Thr Phe Arg Asn Glu Lys  
     1                    5                    10                    15

Glu Leu Arg Asp Phe Ile Glu Lys Phe Glu Gly Arg  
                     20                    25

<210> 7  
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<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 7  
 Gln Gln Tyr Thr Ala Lys Ile Lys Gly Arg Ile Phe Arg Asn Glu Lys  
     1                    5                    10                    15

Glu Leu Arg Asp Phe Ile Glu Arg Phe Glu Gly Arg  
                     20                    25

<210> 8  
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<220>  
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<400> 8  
 Glu Gln Tyr Thr Ala Lys Ile Lys Gly Lys Thr Phe Arg Asn Lys Arg  
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Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                     20                    25

<210> 9  
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 <223> Description of Artificial Sequence: Synthetic

<400> 9  
 Glu Gln Tyr Thr Ala Lys Tyr Lys Gly Arg Thr Phe Arg Asn Lys Arg  
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Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                     20                    25

<210> 10  
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   1                  5                  10                  15  
  
 Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                   20                  25  
  
  
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 <400> 11  
 Gln Arg Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Glu Lys  
   1                  5                  10                  15  
  
 Glu Leu Arg Asp Phe Ile Glu Arg Phe Lys Gly Arg  
                   20                  25  
  
  
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 Gln Glu Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Glu Lys  
   1                  5                  10                  15  
  
 Glu Leu Arg Asp Phe Ile Glu Arg Phe Lys Gly Arg  
                   20                  25  
  
  
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 <400> 13  
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   1                  5                  10                  15  
  
 Leu Arg Asp Phe Ile Glu His Phe Lys Gly Arg  
                   20                  25  
  
  
 <210> 14  
 <211> 28

<212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 14  
 Thr Gln Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Lys Glu  
     1                    5                    10                    15

Glu Leu Lys Lys Phe Ile Glu Lys Phe Lys Gly Arg  
                     20                    25

<210> 15  
 <211> 28  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 15  
 Gln Glu Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Lys Arg  
     1                    5                    10                    15

Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                     20                    25

<210> 16  
 <211> 28  
 <212> PRT  
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<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 16  
 Glu Gln Tyr Thr Ala Lys Ile Lys Gly Arg Thr Phe Arg Asn Glu Lys  
     1                    5                    10                    15

Glu Ile Arg Asp Phe Ile Glu Lys Phe Thr Gly Arg  
                     20                    25

<210> 17  
 <211> 28  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 17  
 Glu Gln Tyr Thr Ala Lys Ile Lys Gly Lys Thr Phe Arg Asn Glu Arg  
     1                    5                    10                    15

Glu Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                     20                    25

<210> 18  
 <211> 28  
 <212> PRT  
 <213> Artificial Sequence  
  
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 <400> 18  
 Gln Gln Tyr Thr Ala Lys Ile Lys Gly Lys Thr Phe Arg Asn Lys Asp  
   1                  5                  10                  15  
 Glu Leu Lys Lys Phe Ile Glu Lys Phe Lys Gly Arg  
                   20                  25

<210> 19  
 <211> 28  
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 <400> 19  
 Gln Gln Tyr Thr Ala Lys Ile Lys Gly Lys Thr Phe Arg Asn Lys Arg  
   1                  5                  10                  15  
 Glu Leu Gln Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                   20                  25

<210> 20  
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 <400> 20  
 Glu Gln Tyr Thr Ala Lys Val Lys Gly Glu Thr Phe Glu Asn Glu Lys  
   1                  5                  10                  15  
 Arg Leu Arg Asp Phe Ile Glu Lys Phe Lys Gly Arg  
                   20                  25

<210> 21  
 <211> 28  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
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 <400> 21  
 Glu Gln Tyr Thr Ala Lys Ile Lys Gly Lys Thr Phe Arg Asn Glu Lys  
   1                  5                  10                  15

Glu Leu Lys Arg Phe Ile Glu Lys Phe Lys Gly Arg  
20 25

<210> 22  
<211> 28  
<212> PRT  
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<220>  
<223> Description of Artificial Sequence: Synthetic

<400> 22  
Glu Gln Tyr Thr Ala Lys Phe Lys Gly Lys Thr Phe Arg Asn Lys Glu  
1 5 10 15

Glu Leu Lys Lys Phe Ile Glu Lys Phe Lys Gly Arg  
20 25

<210> 23  
<211> 33  
<212> PRT  
<213> yeast

<400> 23  
Arg Met Lys Gln Leu Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Val Gly Glu  
20 25 30

Arg

<210> 24  
<211> 33  
<212> PRT  
<213> yeast

<400> 24  
Arg Met Lys Gln Leu Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Ala Gly Glu  
20 25 30

Arg

<210> 25  
<211> 33  
<212> PRT  
<213> yeast

<400> 25  
Arg Met Lys Gln Leu Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Met Ala Arg Leu Lys Lys Leu Val Gly Glu  
20 25 30

Arg

<210> 26  
<211> 33  
<212> PRT  
<213> yeast

<400> 26  
Arg Leu Lys Gln Met Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Val Gly Glu  
20 25 30

Arg

<210> 27  
<211> 33  
<212> PRT  
<213> yeast

<400> 27  
Arg Leu Lys Gln Met Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Ala Gly Glu  
20 25 30

Arg

<210> 28  
<211> 33  
<212> PRT  
<213> yeast

<400> 28  
Arg Met Lys Gln Trp Glu Asp Lys Ala Glu Glu Leu Leu Ser Lys Asn  
1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Val Gly Glu  
20 25 30

Arg

<210> 29  
<211> 33  
<212> PRT  
<213> yeast

<400> 29



Arg Met Lys Gln Phe Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
 1 5 10 15

Tyr His Leu Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Val Gly Glu  
 20 25 30

Arg

<210> 30  
 <211> 33  
 <212> PRT  
 <213> yeast

<400> 30  
 Arg Met Lys Gln Leu Glu Asp Lys Val Glu Glu Leu Leu Ser Lys Asn  
 1 5 10 15

Tyr His Ala Glu Asn Glu Val Ala Arg Leu Lys Lys Leu Val Gly Glu  
 20 25 30

Arg

<210> 31  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 31  
 Lys Gln Asp Glu Glu Ser Tyr His Asn Ala Arg Lys  
 1 5 10

<210> 32  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 32  
 Glu Lys Asp Arg Glu Arg Arg Arg Glu Arg Arg Glu  
 1 5 10

<210> 33  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Synthetic

<400> 33

Glu Lys Gln Lys Glu Arg Glu Arg Glu Glu Arg Gln  
1 5 10

<210> 34  
<211> 12  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Synthetic

<400> 34  
Ala Arg Ala Ala Ala Ala Arg Arg Arg Ala Arg Ala  
1 5 10

<210> 35  
<211> 12  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Synthetic

<400> 35  
Arg Glu Glu Arg Arg Arg Glu Asp Arg Lys Arg Glu  
1 5 10

<210> 36  
<211> 12  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Synthetic

<400> 36  
Asn Thr Arg Ala Lys Ser Ala Asn His Asn Thr Gln  
1 5 10

<210> 37  
<211> 12  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Synthetic

<400> 37  
Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala  
1 5 10

<210> 38  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 38  
Met Thr Tyr Lys Leu Ile Leu Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 39  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 39  
Met Thr Trp Lys Tyr Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ile Val Asp Ala Ala Thr Phe Glu Lys Val Trp Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Phe Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Leu Thr Ile Thr Glu  
50 55

<210> 40  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 40  
Met Thr Phe Lys Ile Ile Phe Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ile Val Asp Ala Ala Thr Val Glu Lys Val Trp Lys Gln  
20 25 30  
Tyr Val Asn Asp Asn Gly Leu Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Ile Thr Glu  
50 55

<210> 41  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 41  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ile Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Ile Thr Glu  
50 55

<210> 42

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 42

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 43

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 43

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 44

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 44

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala

35 40 45  
 Thr Lys Thr Phe Thr Val Thr Glu  
 50 55  
  
 <210> 45  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.  
  
 <400> 45  
 Met Thr Phe Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
 20 25 30  
 Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
 35 40 45  
 Thr Lys Thr Phe Thr Val Thr Glu  
 50 55  
  
 <210> 46  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.  
  
 <400> 46  
 Met Thr Phe Lys Leu Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
 20 25 30  
 Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
 35 40 45  
 Thr Lys Thr Phe Thr Val Thr Glu  
 50 55  
  
 <210> 47  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.  
  
 <400> 47  
 Met Thr Ala Lys Ala Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Ile Lys Gln  
 20 25 30  
 Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
 35 40 45  
 Thr Lys Thr Ile Thr Ile Thr Glu  
 50 55

<210> 48  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 48  
Met Thr Ala Lys Leu Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Ala Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Ile Thr Ile Thr Glu  
50 55

<210> 49  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 49  
Met Thr Ala Lys Ala Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Ala Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Leu Thr Val Thr Glu  
50 55

<210> 50  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 50  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 51  
<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 51

Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 52

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 52

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Phe Thr Glu  
50 55

<210> 53

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 53

Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Phe Thr Glu  
50 55

<210> 54

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 54

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
 20 25 30

Tyr Leu Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
 35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
 50 55

<210> 55

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 55

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
 20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Val Thr Tyr Asp Asp Ala  
 35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
 50 55

<210> 56

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 56

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
 20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
 35 40 45

Thr Lys Thr Tyr Thr Phe Thr Glu  
 50 55

<210> 57

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 57

Met Thr Phe Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
 1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln



20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 58  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 58  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 59  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 59  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 60  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 60  
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Val Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 61  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 61  
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Val Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 62  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 62  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Tyr Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 63  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 63  
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Tyr Thr Phe Thr Glu  
50 55

<210> 64  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 64  
 Met Thr Tyr Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Tyr Thr Phe Thr Glu  
       50                  55

<210> 65  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 65  
 Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Phe Thr Ile Thr Glu  
       50                  55

<210> 66  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 66  
 Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Ile Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Phe Thr Val Thr Glu  
       50                  55

<210> 67  
 <211> 56  
 <212> PRT

<213> Streptococcus sp.

<400> 67

Met Thr Phe Lys Ile Ile Phe Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 68

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 68

Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Ile Thr Glu  
50 55

<210> 69

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 69

Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ile Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 70

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 70

Met Thr Tyr Lys Ile Ile Phe Asn Gly Lys Thr Leu Lys Gly Glu Thr

1	5	10	15
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln	20	25	30
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala	35	40	45
Thr Lys Thr Phe Thr Val Thr Glu	50	55	

<210> 71  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 71
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr
1 5 10 15
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln
20 25 30
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala
35 40 45
Thr Lys Thr Trp Thr Phe Thr Glu
50 55

<210> 72  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 72
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr
1 5 10 15
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln
20 25 30
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Ile Thr Tyr Asp Asp Ala
35 40 45
Thr Lys Thr Phe Thr Phe Thr Glu
50 55

<210> 73  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 73
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr
1 5 10 15
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln
20 25 30

Tyr Ala Asn Asp Asn Gly Val Asp Gly Glu Ile Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 74  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 74  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 75  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 75  
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 76  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 76  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Ile Thr Glu  
50 55

<210> 77  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 77  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Val Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Phe Thr Glu  
50 55

<210> 78  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 78  
Met Thr Tyr Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Leu Asn Asp Asn Gly Ile Asp Gly Glu Ile Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Phe Thr Glu  
50 55

<210> 79  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 79  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Tyr Thr Ile Thr Glu  
50 55

<210> 80  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 80  
Met Thr Phe Lys Ile Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Val Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 81  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 81  
Met Thr Phe Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 82  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 82  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 83  
<211> 56  
<212> PRT  
<213> Streptococcus sp.



<400> 83

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 84

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 84

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ile Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 85

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 85

Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Leu Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ile Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 86

<211> 56

<212> PRT

<213> Streptococcus sp.

<400> 86

Met Thr Ala Lys Ala Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Ala Lys Gln  
                   20                                  25                                  30

Tyr Ala Asn Asp Asn Gly Leu Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                                  40                                  45

Thr Lys Thr Ala Thr Ala Thr Glu  
           50                                  55

<210> 87  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 87  
 Met Thr Phe Lys Ala Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
       1                                  5                                  10                                  15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Ala Lys Gln  
                   20                                  25                                  30

Tyr Ala Asn Asp Asn Gly Leu Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                                  40                                  45

Thr Lys Thr Ala Thr Ala Thr Glu  
           50                                  55

<210> 88  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 88  
 Met Thr Phe Lys Ala Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
       1                                  5                                  10                                  15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                                  25                                  30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                                  40                                  45

Thr Lys Thr Phe Thr Val Thr Glu  
           50                                  55

<210> 89  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 89  
 Met Thr Phe Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
       1                                  5                                  10                                  15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                                  25                                  30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 90  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 90  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Phe Thr Val Thr Glu  
50 55

<210> 91  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 91  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 92  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 92  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15

Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30

Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45

Thr Lys Thr Trp Thr Val Thr Glu

50

55

<210> 93  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 93  
 Met Thr Val Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Val Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Phe Thr Val Thr Glu  
       50                  55

<210> 94  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 94  
 Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Val Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Phe Thr Val Thr Glu  
       50                  55

<210> 95  
 <211> 56  
 <212> PRT  
 <213> Streptococcus sp.

<400> 95  
 Met Thr Phe Lys Leu Ile Ala Asn Gly Lys Thr Leu Lys Gly Glu Thr  
   1                  5                  10                  15  
 Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
                   20                  25                  30  
 Tyr Ala Asn Asp Asn Gly Leu Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
                   35                  40                  45  
 Thr Lys Thr Trp Thr Val Thr Glu  
       50                  55

<210> 96

<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 96  
Met Thr Phe Lys Leu Ile Leu Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Leu Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Ala Thr Glu  
50 55

<210> 97  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 97  
Met Thr Phe Lys Leu Ile Val Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Ala Val Asp Ala Ala Thr Ala Glu Lys Val Phe Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Trp Thr Val Thr Glu  
50 55

<210> 98  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 98  
Met Thr Phe Lys Leu Ile Ile Asn Gly Lys Thr Leu Lys Gly Glu Thr  
1 5 10 15  
Thr Thr Glu Val Val Asp Ala Ala Thr Ala Glu Lys Val Trp Lys Gln  
20 25 30  
Tyr Ala Asn Asp Asn Gly Ile Asp Gly Glu Trp Thr Tyr Asp Asp Ala  
35 40 45  
Thr Lys Thr Leu Thr Val Thr Glu  
50 55

<210> 99  
<211> 56  
<212> PRT  
<213> Streptococcus sp.

<400> 99

Met	Thr	Phe	Lys	Leu	Ile	Val	Asn	Gly	Lys	Thr	Leu	Lys	Gly	Glu	Thr
1				5					10					15	
Thr	Thr	Glu	Ala	Val	Asp	Ala	Ala	Thr	Ala	Glu	Lys	Val	Tyr	Lys	Gln
			20					25					30		
Tyr	Ala	Asn	Asp	Asn	Gly	Ile	Asp	Gly	Glu	Trp	Thr	Tyr	Asp	Asp	Ala
		35					40					45			
Thr	Lys	Thr	Trp	Thr	Val	Thr	Glu								
	50					55									